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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,306	06/26/2003	Tza-Jing Gung	006265 P 01 CPI/COPPER	8991

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Applied Materials, Inc.
Patent / Legal Dept.
M/S 2061
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EXAMINER

VERSTEEG, STEVEN H

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 03/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/608,306	Applicant(s) <i>ck</i> GUNG ET AL.	
	Examiner Steven H VerSteeg	Art Unit 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 February 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 24-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1, 2, 5-12 and 24 is/are allowed.
- 6) ☒ Claim(s) 25-27 and 29-32 is/are rejected.
- 7) ☒ Claim(s) 3, 4 and 28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>11/24/03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "56" and "60" have both been used to designate "magnetron" (see page 3). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "80" has been used to designate both "capacitive coupling circuit" (see page 3 and Figure 2) and "initial plasma distribution" (see page 7 and Figure 4). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any

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required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character “64” has been used to designate both “outer pole” and “roof magnet” (see page 10). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character “162” has been used to designate both “RF coil” and “inner shield” (see page 12). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

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5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: **56** (see page 3 at lines 19 and 25) and **129** (see page 13 at lines 5 and 19). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: **66** (see Figures 2 and 5) and **174** (see Figure 11). Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any

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required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

7. The disclosure is objected to because of the following informalities: please insert the patent number for the parent application on pages 9, 11, and 12.

Appropriate correction is required.

Claim Objections

8. Claims 3, 4, and 29-32 are objected to because of the following informalities: a period needs inserted at the end of claim 3 and "coil" needs inserted after "RF" in line 5 of claim 29. Claim 4 depends from claim 3 and contains all of the limitations of claim 3. Therefore, claim 4 is objected to for the same reasons as claim 3. Claims 30-32 depend from claim 29 and contain all of the limitations of claim 29. Therefore, claims 30-32 are objected to for the same reasons as claim 29. Appropriate correction is required.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 26 and 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

11. Claim 26 recites the limitation "said first and second solenoid coils" in line 1. There is insufficient antecedent basis for this limitation in the claim.

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12. Claim 27 depends from claim 26 and contains all of the limitations of claim 26.

Therefore, claim 27 is rejected for the same reasons as claim 26.

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

13. Claims 25-27, 29, 31, and 32 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6,579,421 B1 to Fu

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

14. For claim 25, Applicant requires a plasma sputter and processing reactor comprising a vacuum chamber arranged about a central axis and configured to be sealed to a sputter target and comprising a surface material to be sputtered; a pedestal when in a processing position for supporting a substrate to be processed in opposition to the target across a processing space extending along the central axis between the target and pedestal; a first electromagnetic coil and a second electromagnetic coil coaxially arranged around the central axis and radially outside of the processing space, wherein the second coil is disposed radially outside of the first coil and is at least partially coextensive therewith along the central axis.

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15. For claim 29, Applicant requires a processing method comprising exciting a plasma within a reactor to effect processing of the substrate and passing a substantially DC current through an electromagnetic coil of a sufficient level to inhibit diffusion of the plasma to an RF coil. The apparatus comprising a vacuum chamber arranged about a central axis and sealed to a sputter target; a pedestal supporting a substrate to be processed in opposition to the target across a processing space extending along the central axis between the target and pedestal; an RF coil arranged around the central axis; and an electromagnetic coil arranged radially outside the RF coil and at least partially axially co-extensive therewith.

16. Fu discloses a sputter apparatus comprising a vacuum chamber **12**; pedestal **14** opposite to the target; RF coil **24**; and electromagnetic coils **30-33** arranged coextensive with the RF coil and radially outside the coil (Figures 3 and 4). The method involves exciting a plasma and passing a DC current through the electromagnetic coils (col. 4, l. 66 – col. 5, l. 8; claim 13). It is inherent that plasma is inhibited from diffusion to the RF coil.

17. For claim 26, Applicant requires the coils to be independently powered. For claim 27, Applicant requires a first power supply powering the first coil and a second power supply powering the second coil. Fu discloses separate power supplies (Figures 3 and 4).

18. For claim 31, Applicant requires the exciting step to include applying DC power to the target. For claim 32, Applicant requires applying RF power to the coil. The target is DC powered (col. 3, l. 26-28) and the coil is RF powered (col. 3, l. 54-56).

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. Claim 30 is rejected under 35 U.S.C. 103(a) as being obvious over US 6,579,421 B1 to Fu in view of *Method For Controlling The Crystalline Phase Of Tantalum*, IBM Technical Disclosure Bulletin, Vol. 32, No. 5A pg. 42-43, October 1989 (IBM).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(I)(1) and § 706.02(I)(2).

21. For claim 30, Applicant requires the target to comprise a surface region of tantalum. Fu does not disclose the target material, thus, any suitable sputtering material would be obvious.

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22. IBM discloses that tantalum is a known sputtering target material (pg. 42).

23. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Fu to utilize tantalum as the sputtering target material because of the desire to utilize a known sputtering target material.

Allowable Subject Matter

24. Claims 1, 2, 5-12, and 24 are allowed.

25. Claim 28 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

26. Claims 3 and 4 would be allowable if written to overcome the claim objection presented above.

27. The following is a statement of reasons for the indication of allowable subject matter: it is neither anticipated nor obvious over the prior art of record to have a plasma sputter reactor as claimed by Applicant in claim 1; or a plasma sputter and processing reactor as claimed by Applicant in claim 9; or a plasma sputter and processing reactor as claimed by Applicant in claim 28.

28. Fu discloses the electromagnets to be 4 separate square shaped magnets around the RF coil. The electromagnets are thus not annular rings and not multi-turn coils.

29. US 2004/0020770 A1 to Wang et al. (Wang) does not disclose the two separate coils (130 and 140) to be coextensive.

30. US 2002/0005348 A1 to Xu et al. (Xu) does not disclose the separate coils to be coextensive.

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31. US 6,514,390 B1 to Xu et al. (Xu) does not disclose the separate coils to be coextensive (Figure 2).
32. US 6,096,176 to Horiike et al. (Horiike) does not disclose the coils to be arranged around the central axis (col. 4, l. 3-5).
33. US 5,178,739 to Barnes et al. (Barnes) does not disclose the magnets outside the chamber and around the RF coil to be a magnetic ring. Also, Figure 5 shows that the coils are not coextensive. Instead, multiple magnets are utilized.
34. It would not be obvious to modify Fu, Wang, Xu, Xu, Horiike, or Barnes to provide the limitations unless hindsight reasoning is used.

General Information

For general status inquiries on applications not having received a first action on the merits, please contact the Technology Center 1700 receptionist at (571) 272-1700.

For inquiries involving Recovery of lost papers & cases, sending out missing papers, resetting shortened statutory periods, or for restarting the shortened statutory period for response, please contact Denis Boyd at (571) 272-0992.

For general inquiries such as fees, hours of operation, and employee location, please contact the Technology Center 1700 receptionist at (571) 272-1300.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H VerSteeg whose telephone number is (571) 272-1348. The examiner can normally be reached on Mon - Thurs (6:30 AM - 5:00 PM).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Steven H VerSteeg
Primary Examiner
Art Unit 1753

shv
March 1, 2005